

REVIEW ARTICLE

The impact of river pollution on health disorders

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River pollution in Indonesia is a serious problem that has a wide impact on public health. Rivers, as the main water source for many communities, are often polluted by human activities, such as industrial waste, domestic waste, and agriculture. Method: This study is a literature review. The database used in searching for this article is Google Scholar, 5 journals were obtained which were then analyzed for topic suitability, discussed based on criteria from variable similarities and differences. time span 2018–2021. Results: Diseases related to water pollution in communities living around polluted rivers often experience various health problems. Some common diseases include skin irritation such as itching and dermatitis, which are caused by direct contact with polluted river water. suffering from diarrhea is caused by consuming contaminated water or food. Diarrhea is one of the most common diseases, especially among children and cases of dysentery are also found. Conclusion: Diseases related to poor water quality include skin irritation such as dermatitis, which are caused by direct contact with polluted river water. suffering from diarrhea is caused by consuming contaminated water or food and cases of dysentery are also found.

Keywords: River Pollution, Diseases.**INTRODUCTION**

River pollution in Indonesia is a serious problem that has a wide impact on public health. Rivers, as the main source of water for many communities, are often polluted by human activities, such as industrial waste, domestic waste, and agricultural waste (Ashar et al., 2020). According to data from the Ministry of Environment and Forestry, around 68% of river water conditions in Indonesia are in the heavily polluted category. This shows that the quality of water used for various daily needs, including bathing, washing, and cooking, is very concerning (Hamidi et al., 2017).

Water pollution can cause various serious health problems. Common diseases caused by water pollution include diarrhea, this disease is one of the most common impacts of water pollution, especially in children (Ritiau, 2021). Diarrhea is caused by bacteria and parasites found in contaminated water, which can lead to dehydration and even death if not treated properly. Cholera, this disease is caused by the bacteria *Vibrio cholerae* which can spread through contaminated water (Rohmah and Syahrul, 2017). Symptoms of cholera include severe diarrhea and dehydration. Hepatitis A, this disease attacks

the liver and can be spread through food or water contaminated with feces. Skin Diseases, exposure to polluted water can cause various skin problems such as dermatitis and infections. Chronic Diseases, Water pollution can also increase the risk of chronic diseases such as kidney and bladder cancer due to exposure to hazardous chemicals (Rosdiana et al., 2023).

With the increasing level of river pollution in Indonesia, it is important to understand its impact on public health. Better prevention and waste management efforts are needed to protect water quality and public health. Awareness of the importance of maintaining the cleanliness of water resources must be increased to prevent wider negative impacts on public health and the environment.

MATERIALS AND METHODS

This research is a literature review. Literature review is a methodology used in research that aims to collect and take the core of previous research and analyze several overviews of experts written in the text (Nurislaminingsih et al., 2020). Conclude that literature review has a role as a foundation for various types of research because the results of literature review provide an understanding of the development of knowledge, a source of stimulus for policy making, sparking the creation of new ideas and is useful as a guide for research in certain fields (Famuji and Sunarti, 2022). The database used in searching for this article is Google Scholar, using the keywords "River Pollution" and "Diseases Caused by River Pollution" which have been carried out by previous researchers in Indonesia that can be scientifically accounted for. The articles searched for and used in this writing are articles published from 2018 to 2021 from various sources of journals, both national and international. In the initial search stage, the overall results were 5 journals which were then analyzed for the suitability of the topic, background, objectives, research methods to the results and discussion of each journal. Then discussed based on the criteria of variable similarities and differences. Articles published with a time span of 2018–2021.

RESULTS AND DISCUSSION

River pollution can cause various diseases, both infectious and non-infectious. Infectious diseases such as diarrhea, dysentery, cholera, and hepatitis. The disease are commonly found in communities using contaminated river water for daily activities. Additionally, long-term exposure to toxic chemicals from industrial waste can increase the risk of non-infectious diseases such as cancer, and endocrine disorders (Le and Nguyen, 2024).

River pollution in Indonesia has a significant impact on public health. Based on various studies conducted, the following are the results of the discussion regarding these impacts. The level of river pollution data from the Ministry of Environment and Forestry shows that of the 140 rivers studied, 73.24% are in a polluted status. Water quality parameters such as BOD (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand), and the presence of E. Coli bacteria show numbers that exceed the established quality standards. This shows that many rivers in Indonesia are not suitable for use for daily activities.

Table 1. Previous research on river pollution and its impact on health

Author	Objective	Design	Sample	Variables	Results
Fitria and Hayani, 2021 - Relationship Between Types of Water Sources and Personal Hygiene with Dermatitis Disease in Bantan Timur Village, Bantan District, Bengkalis Regency	To determine the relationship between types of water sources and personal hygiene with the incidence of dermatitis in Darul Takzim Hamlet, Bantan Timur Village, Bantan District, Bengkalis Regency.	Cross Sectional Study	The number of samples was 56 respondents taken using the Purposive Sampling technique	Water sources, personal hygiene, dermatitis	The incidence of Dermatitis disease was experienced by 43 respondents (76.8%) and those who did not experience Dermatitis disease were 13 people (23.2%). The types of clean water sources used by respondents were ditch water by 45 people (80.4%), dug wells by 3 people (5.4%), drilled wells by 7 people (12.5%), and rainwater by 1 person (1.8%). The personal hygiene of respondents included in the good category was 53 people (94.6%) and less good was 3 people (5.4%). There is a relationship between the type of water source and the incidence of Dermatitis disease in Darul Takzim Hamlet, Bantan Timur Village, Bantan District, Bengkalis Regency with the results of the Chi Square statistical test obtained a p-value of 0.000 so that the p-value <0.05.
Manalu and Putri, 2019 - Relationship between River Water Utilization and the Incidence of Dermatitis Symptoms	To see the relationship between the use of river water and the incidence of dermatitis symptoms in Lantasan Lama Village, Patumbak District, Deli Serdang Regency.	Cross-sectional	108 families	Age, education, use of river water, dermatitis symptoms	The results showed that the largest percentage based on the age of respondents was at the age of 36-45 years. The largest percentage based on the education of respondents was high school education. River users use river water quite badly. River users use river water with the largest percentage of washing. Most river users experience symptoms of dermatitis. There is a relationship between the use of river water and the incidence of dermatitis (p-value = 0.001).

Table 1. Previous research on river pollution and its impact on health

Author	Objective	Design	Sample	Variables	Results
Susanti et al., 2018 - Risk Factors for Diarrhea Cases in the Community Living Along the Deli River, North Sumatra	To determine the risk factors for diarrhea in communities living along the Deli River, North Sumatra.	Cross Sectional	96 samples	Toilet use, clean water, hand washing, waste management, human waste, diarrhea	The risk of diarrhea increased with lack of toilet use (OR = 1.67; 95% CI = 0.99 to 2.79; p = 0.040), poor use of clean water (OR = 1.66; 95% CI = 1.02 to 2.70; p = 0.035), hand washing without soap (OR = 1.74; 95% CI = 1.12 to 2.68; p = 0.002), poor waste management (OR = 2.50; 95% CI = 1.33 to 4.89; p = 0.001), and improper disposal of human waste (OR = 1.64; 95% CI = 1.04 to 2.60; p = 0.032).
Avita and Sahani, 2020 - The Relationship Between Personal Hygiene and Dermatitis Disease at Babul Khaer Islamic Boarding School, Bulukumba Regency	to find out the relationship between personal hygiene and dermatitis at Babul Khaer Islamic Boarding School, Bulukumba Regency	cross-sectional	45 people and 9 bedrooms	Cleanliness of Hands and Nails, Bathing habits of female students, Changing clothes habits, Cleanliness of beds and sheets, Physical quality of water, Bedroom temperature, Bedroom humidity	The results of the study showed that the cleanliness of the skin of the hands and nails met the requirements of eight respondents (18%) and did not meet the requirements of 37 respondents (82%), the habit of bathing met the requirements of 11 respondents (24%) and did not meet the requirements of 34 respondents (76%), the cleanliness of the bed and sheets did not meet the requirements of 45 (100%), the clean water used met the requirements of nine rooms (100%), the humidity did not meet the requirements of nine rooms (100%). The variables of the habit of changing clothes and the temperature of the bedroom based on the results of statistical tests obtained a value of $P = 0.01 < \alpha = 0.05$ and a value of $P = 0.02 < \alpha = 0.05$ which means that there is a significant relationship between the habit of changing clothes and the temperature of the bedroom with Dermatitis disease.

Table 1. Previous research on river pollution and its impact on health

Author	Objective	Design	Sample	Variables	Results
Melani, 2018 – The Relationship Between Personal Hygiene and the Incidence of Skin Diseases in Correctional Residents in Class II A Women's Correctional Institutions in Malang	determine the relationship between personal hygiene and the incidence of skin diseases in correctional inmates at the Class II A Malang Women's Correctional Institution	cross section	228 people	personal hygiene, skin disease	The results of statistical analysis using the Chi square test obtained a p value (0.003) which was smaller than the value (0.05) so that there was a significant relationship between personal hygiene and the incidence of skin diseases in correctional inmates. Personal hygiene prevented 0.08 times the risk of skin disease in correctional inmates.

According to a recent study by Ezemonye et al., 2019 heavy metals such as mercury (Hg) and lead (Pb) found in rivers near industrial areas exceed the permissible limits set by the Ministry of Environment and Forestry. Long-term exposure to these heavy metals can lead to kidney dysfunction and contribute to an increased risk of bladder and liver cancer.

Moreover, the presence of microplastics in river water has become a growing concern in environmental studies. Research by Sari et al., 2021 found that microplastics from household and industrial waste are present in high concentrations in major Indonesian rivers. Microplastics can act as vectors for pathogenic bacteria and hazardous chemicals, posing significant health risks to humans.

Water pollution-related diseases in communities living around polluted rivers often experience various health problems. Some common diseases include skin irritation, around 70.31% of respondents studied experienced skin problems such as itching and dermatitis, which were caused by direct contact with polluted river water. Diarrhea, around 23.44% of respondents suffered from diarrhea, which can be caused by consuming contaminated water or food. Diarrhea is one of the most common diseases, especially among children. Dysentery was also found in 6.25% of respondents, which is closely related to poor sanitation and the use of polluted water for daily needs.

The incidence of Dermatitis disease was experienced by 43 respondents (76.8%) and those who did not experience Dermatitis disease were 13 people (23.2%). The types of clean water sources used by respondents were ditch water by 45 people (80.4%), dug wells by 3 people (5.4%), drilled wells by 7 people (12.5%), and rainwater by 1 person (1.8%). The personal hygiene of respondents who were included in the good category were 53 people (94.6%) and less good were 3 people (5.4%). There is a relationship between the type of water source and the incidence of Dermatitis disease in Darul Takzim Hamlet, Banten Timur Village, Banten District, Bengkalis Regency with the results of the Chi Square statistical test obtained a p value of 0.000 so that the p value <0.05 (Fitria and Hayani, 2021).

According to Manalu and Putri, 2019 that the results of the study showed that the largest percentage based on the age of respondents was at the age of 36–45 years. The largest percentage based on the education of respondents was high school education. River users use river water quite badly. River users use river water with the largest percentage of washing. Most river users experience symptoms of dermatitis. There is a relationship between the use of river water and the incidence of dermatitis (p-value = 0.001). According to Susanti et al., 2018 the risk of diarrhea increases with lack of toilet use to poor use of clean water washing hands without soap, poor waste management and improper disposal of human waste (Manalu and Putri, 2019).

Avita and Sahani, 2020 the results of the study showed that the cleanliness of the skin of the hands and nails met the requirements for eight respondents (18%) and did not meet the requirements for

37 respondents (82%), the habit of bathing met the requirements for 11 respondents (24%) and did not meet the requirements for 34 respondents (76%), the cleanliness of the bed and sheets did not meet the requirements for 45 (100%), the clean water used met the requirements for nine rooms (100%), the humidity did not meet the requirements for nine rooms (100%). The variables of the habit of changing clothes and the temperature of the bedroom based on the results of statistical tests obtained a value of $P = 0.01 < \alpha = 0.05$ and a value of $P = 0.02 < \alpha = 0.05$ which means that there is a significant relationship between the habit of changing clothes and the temperature of the bedroom with Dermatitis disease. Melani, 2018 the results of statistical analysis with the Chi square test obtained a p value (0.003) which is smaller than the α value (0.05) so that there is a significant relationship between personal hygiene and the incidence of skin diseases in correctional inmates. Personal hygiene prevents 0.08 times the risk of skin disease in correctional inmates.

The causes of river pollution are caused by various factors, including domestic waste, many people dump household waste and feces directly into rivers, increasing the number of pathogenic bacteria such as *Escherichia coli* and *Shigella* sp (Widiyanti, 2019). Many households still dispose of waste directly into rivers without proper treatment, including fecal waste containing *Escherichia coli* and *Shigella* sp., which are primary causes of diarrhea and dysentery (Hasan and Rahman, 2018). Industrial waste, the disposal of liquid waste from industry without adequate processing contributes greatly to water pollution resulting in ecosystem damage and decreased water quality (Effendi, 2018). Some industries in Indonesia lack adequate waste treatment systems, leading to the direct discharge of wastewater containing heavy metals and toxic chemicals into rivers (Suryani et al., 2022). Agricultural Waste, the use of pesticides and chemical fertilizers in agriculture can contaminate rivers through runoff during rainfall. A study by Siregar and Kiswiranti, 2020 found that nitrate and phosphate levels in river water in agricultural areas exceed water quality standards, leading to excessive algae growth and reduced oxygen levels in the water.

Mitigation efforts to overcome this pollution problem require mitigation steps such as waste management, improving domestic and industrial waste management so as not to pollute water sources (Baihaqi et al., 2024). Community Education, increasing public awareness of the importance of maintaining environmental cleanliness and the use of clean water. Sanitation facilities, providing adequate sanitation facilities such as toilets and wastewater treatment plants (WWTP) to reduce pollution from human waste (Allu et al., 2023).

CONCLUSIONS

The impact of river pollution in Indonesia on public health is very serious. Diseases related to water pollution in communities living around polluted rivers often experience various health problems. Some common diseases include skin irritation such as itching and dermatitis, which are caused by direct contact with polluted river water. Diarrhea which can be caused by consuming contaminated water or food and cases of dysentery are also found to be closely related to poor sanitation and the use of polluted water for daily needs. Diseases related to poor water quality indicate the need for immediate action to improve environmental conditions. Collaborative efforts between government, industry, and communities are essential to reduce pollution and protect public health.

Author contributions

Rajeev Pratap Singh: Conceptualization, analysis, writing draf, and editing.

Conflict of Interest

There is no conflict of interest in this study.

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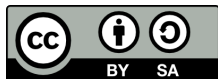
Data availability

Data related to the findings of this study are available at the corresponding author.

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